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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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THE FIRM OF KARL F ROSS  
5676 RIVERDALE AVENUE  
PO BOX 900  
RIVERDALE (BRONX), NY 10471-0900

EXAMINER

MCNELIS, KATHLEEN A

ART UNIT PAPER NUMBER

1742

DATE MAILED: 11/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/728,117

Applicant(s)

DITTRICH ET AL.

Examiner

Kathleen A. McNelis

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1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 6-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 6-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **Acknowledgement of RCE**

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.115, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 22 September 2005 has been entered.

### **Claims Status**

Claims 1-3 and 6-11 remain for examination wherein claim 1 is amended. Claim 6 is listed as "currently amended", however this amendment has been presented previously (May 15, 2005 amendment). Claims 4 and 5 were canceled.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bogan et al. (U.S. Pat. No. 5,228,902) in view of Rossborough (U.S. Pat. No. 5,358,550).

Bogan et al. discloses a method for treating molten steel by applying a degassing vacuum (abstract). Solid granulate (lumps) are added to the steel in a vacuum degassing of molten steel as a desulphurization agent (abstract). The size of solid granulate is between ¼ inch and 3 inches (6.4 to 76.2 mm), especially between about ½ inch and 2 inches (13 mm and 50.8 mm) and preferably under 1 inch maximum (25.4 mm; col. 3 lines 1-10) which overlaps with the claimed range of between 2 and 50 mm. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a granulate in the size range of between about ¼ and 2 inches (6.4 and 50 mm) in the degassing processes of Bogan et al., since Bogan et al. teaches that

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the entire range between  $\frac{1}{4}$  and 3 inches (6.4 to 76 mm) provides adequate surface area for desulphurization (col. 2 line 62 to col. 3 line 12).

Bogan et al. does not specifically disclose that the desulphurization agent is porous.

Rossborough teaches the method of adding a desulphurization agent to molten pig-iron wherein the desulphurization agent is a combination of a gas producing compound, a calcium compound absorbed onto a slag-forming agent that removes sulfur from the ferrous material and entraps it in the slag layer (col. 2 lines 15-22). The slag-forming agent is diatomaceous silica, selected because in addition to being a good slag-forming agent for enhancing removal of sulfur from pig iron, it is porous and therefore able to absorb the other media (col. 5 lines 4-47). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the porous silica containing desulphurization agent disclosed by Rossborough in the method of Bogan et al. to provide a combination desulphurization agent and slag forming agent which will remove sulfur from the steel and entrap sulfur in the slag as taught by Rossborough.

With respect to claim 2, Bogan et al. in view of Rossborough teaches that depending upon the sulfur content of the steel, the desulphurization agent is typically added within either the first 60 seconds or after about 3 minutes (Bogan et al., col. 3, lines 28-36) which are within the claimed range of within the first 5 minutes.

Claims 3 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bogan et al. (U.S. Pat. No. 5,228,902) in view of Rossborough (U.S. Pat. No. 5,358,550) and further in view of Kato et al. (U.S. Pat. No. 5,304,231).

Bogan et al. in view of Rossborough discloses a method for vacuum degasification of steel wherein porous granules of solid desulphurization agent are added to the melt as described above. The pressure is at about 1 torr maximum ( $< 1.3$  millibars; Bogan et al., col. 3 lines 20-25). Bogan et al. in view of Rossborough disclose an addition rate in wt of desulphurization agent/weight of steel and indicate that appropriate timing for addition of desulphurization agent (col. 3 lines 16-36).

Bogan et al. in view of Rossborough is silent with regard to the additive flowrates for specific batches, and therefore does not teach that the feed rate is between 20 and 100 kg/min as in instant claim 3.

Kato et al. disclose a process for refining ultra-low sulfur steel in a short time without causing any contamination of the steel (col. 3 lines 20-26). Kato et al. provides a specific example of a RH Vacuum degassing treatment process wherein a degassing agent is added at a rate of 30 to 60 kg/min (col. 11 lines 50-60), which is within the claimed range of between 20 and 100 kg/min. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an addition rate of between 30 to 60 kg/min as taught by Kato et al. for the addition of desulphurization agent to steel in the process of Bogan et al. in view of Rossborough to produce ultra-low sulfur steel in a short time without causing any contamination as taught by Kato et al.

With respect to claim 6, the degasification solid includes metals in the form of silicon, aluminum, iron, calcium and magnesium oxides (Rossborough col. 5 lines 30-40). With respect to claim 7, the degasification solid includes iron oxides (Rossborough col. 5 lines 30-40), which is a component of iron ores.

With respect to claim 8, the feed is introduced into the vacuum chamber through vacuum lock hoppers (col. 3 lines 1-12), which is a different way of saying it is stored in a vacuum bunker and metered into the molten steel.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bogan et al. (U.S. Pat. No. 5,228,902) in view of Rossborough (U.S. Pat. No. 5,358,550) and Kato et al. (U.S. Pat. No. 5,304,231) and further in view of Metz (U.S. Pat. No. 4,518,422).

Bogan et al. in view of Rossborough and Kato et al. discloses a method for vacuum degasification of steel wherein porous granules of solid desulphurization agent are added from a vacuum bunker to the molten steel as described above.

Bogan et al. in view of Rossborough and Kato et al. does not teach adding solids to the melt via a vibrating trough.

Metz describes a method and apparatus to improve the dephosphorization, desulphurization, deoxidation and purification of a metal melt (col. 1 lines 55-61) wherein solids are fed through vibrating regulators or feeders onto a vibrating chute (col. 6 lines 50-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the vibrating feed regulator and chute taught by Metz to feed solid agents to the process of Bogan et al. in view of Rossborough and Kato et al.

to improve the dephosphorization, desulphurization, deoxidation and purification of the metal melt.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bogan et al. (U.S. Pat. No. 5,228,902) in view of Rossborough (U.S. Pat. No. 5,358,550) and Kato et al. (U.S. Pat. No. 5,304,231) and further in view of Endoh et al. (U.S. Pat. No. 4,661,151).

Bogan et al. in view of Rossborough and Kato et al. discloses a method for vacuum degasification of steel wherein porous granules of solid desulphurization agent are added from a vacuum bunker to the molten steel as described above.

Bogan et al. in view of Rossborough and Kato et al. does not teach adding solids to the melt by lances extending into the melt.

Endoh et al. discloses a method for desulphurizing molten steels (abstract) wherein solid desulphurization agents are blown into the melt by a submerged lance (Figure 4, col. 11, lines 1-13, col. 14 lines 26-45) which provides an economic desulphurization treatment while minimizing erosion of the basic refractory (col. 3 lines 11-25). The submerged lance blows solids into the melt by nozzles opening below the surface of the melt as in claim 10, and the lances extend below the melt surface as in claim 11. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the injection lance disclosed by Endoh et al. to inject the solid desulphurization agent into the process of Bogan et al. in view of Rossborough and Kato et al. to achieve low cost desulphurization while minimizing erosion of the basic refractory as taught by Endoh et al.



### **Response to Arguments**

Applicant's arguments with respect to claims 1-3 and 6-11 have been considered but are moot in view of the new ground(s) of rejection.

The correction of informalities on pages 6, 7, 11, 13 and 18 of the specification is acknowledged.

Receipt of IDS is acknowledged; however IDS contained no new citations.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571-272-3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
ROY KING  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700